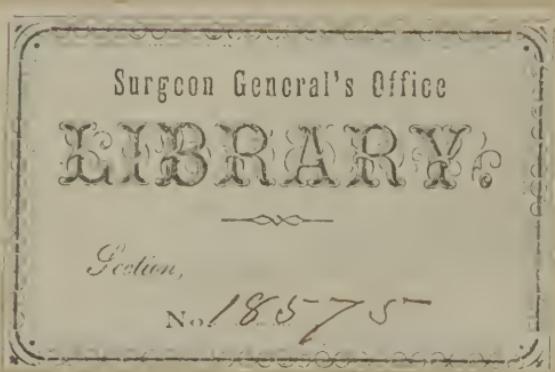


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1822





OBSERVATIONS ON THE YELLOW FEVER,

WITH AN ACCOUNT OF A NEW MODE OF TREATMENT AND
CURE FOR THE SAME, AS WELL AS FOR PUTRID AND
MALIGNANT DISEASES IN GENERAL, APPLICABLE ALSO
TO CASES OF POISONING BY MINERAL OR VEGETABLE
SUBSTANCES; A PARALLEL BETWEEN THE YELLOW FE-
VER AND THE PLAGUE; THEIR CAUSES; THE RATIONAL
TREATMENT OF THE LATTER, WITH THE MEANS OF RE-
TARDING OR PREVENTING THE RETURN OF BOTH.

Felix qui potuit rerum cognoscere causas.

1817.5



BY ANTHONY PLANTOU,
SURGEON AND DENTIST.

PHILADELPHIA.

1822.

WCK
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Film no. 10434, item 3

TO THE PRESIDENT AND MEMBERS OF THE MEDICAL SOCIETY OF PHILADELPHIA.

GENTLEMEN,

The kindness you have shown me, by your public approval of the terro-metallic teeth prepared by me, as the best substitute for the natural ones, induces me, from a motive of gratitude, to dedicate to you the following observations, the fruit of my reflections and experience, which, I trust, will prove useful to the cause of humanity. Should such be the case, my wishes will be amply fulfilled.

I remain, gentlemen,

Your obliged and

Humble Servt.

A. P.

TO THE READER.

PREVIOUSLY to publishing the following observations, I was desirous that an opportunity should be afforded of making a trial in our sister city, of the mode of treatment, which I had found effectual for the disease which has this year afflicted her. I accordingly addressed them to the Board of Health there, in the form in which they are now presented to the public.

I am indebted for the translation of my remarks to the assistance of Mr. Edward W. Wells, Student of medicine.

OBSERVATIONS, &c.

*To the Honourable, the President, and members of the
Board of Health of the city of New-York.*

Philadelphia, Oct. 20th, 1822.

GENTLEMEN,

The dreadful disease which still prevails in New-York, induces me to present to your notice some successful experiments, made by me a few years ago, in relation to its cure. I shall proceed to relate the fact, and to show the reasoning which led me to the discovery.

During my residence in the colonies of Guadaloupe, Martinique, and others, where new-comers from Europe and other temperate climates are constantly exposed to the attacks of yellow fever, I too often heard it avowed by physicians of the first standing, that this fatal disorder triumphed over all the means which could

be brought against it, solely on account of its rapid progress to putrefaction.

Reflecting, therefore, that this disease attacked only new-comers, and comparing the constitution of these with that of the Creoles, I was led to liken the latter to indigenous plants. Their temperament or constitution is in a certain degree modified by nature to fit them for the climate which they inhabit; and the constitution of Europeans and others is not less modified, but is fitted for *their* native country, and when they come within the torrid zone, a change so sudden cannot but produce disastrous consequences. The excessive heat operates on the animal economy of those persons as it does on all bodies solid and fluid; on fluids its action is greater and more remarkable; in the human body their volume is so considerably augmented, that their respective vessels cannot contain them, whence results a general overflowing and derangement in the system, which give rise to the yellow fever; for of all the fluids which enter into our composition, the bile the soonest undergoes the process of fermentation, and in this state it proceeds from its reservoir, already possessed of corrosive properties.* By its accumulation and retention in the stomach and intestines, it becomes the cause of vomiting and black fetid dejections; it soon corrupts and deteriorates the chyle, which being carried into the cir-

* See additional remarks.

culation, decomposes the blood and produces the yellow, livid, black, or purplish hue, as well as the hemorrhages of corrupted blood, from the nose, eyes, and sometimes from the ears, which latter take place equally, if the patient has previously been copiously bled or not.

The most eminent physicians in the colonies with whom I have been acquainted, agree in dividing the yellow fever into three stages. The first stage is distinguished by a sense of oppression and by a general prostration, before the patient is obliged to take to his bed. The second stage is generally inflammatory, but so rapid in its progress, that blood-letting can rarely be employed with advantage. The third and last stage is that of putrefaction. The disease usually terminates fatally in three days, but sometimes it is prolonged to the seventh or ninth day, and when such is the case, there is hope of saving the patient.

The curative means generally employed in the colonies, are blood-letting, bathing, emetics, cathartics, clysters, blistering, the bark in large doses. Notwithstanding these remedies appear calculated to answer the indications, they seldom prove successful, and their failure, it strikes me, arises from their being insufficient to arrest the progress of putrefaction.

Reasoning from analogy, I asked myself if there was not in use to this day, a substance which externally ap-

plied, was found capable, in all cases, of arresting the progress of corruption. The almost miraculous effects of charcoal presented themselves to my view. You are well aware of the great efficacy of this remedy in many cases, when applied to foul ulcers, and of its power of arresting gangrene: you know that meat is preserved by it from putrefaction, and that even when tainted or in a putrescent state, the application of the same restores it, in a great measure, to its original sweetness; in fine, that water which is fetid and in a state of decomposition, becomes sweet and wholesome by being passed through a charcoal filter. From these well-known facts, I concluded that charcoal internally employed as an antiseptic, anti-putrid, or anti-gangrenous remedy, ought to prove specific in yellow fever and putrid diseases in general.

Strongly impressed with the truth of this opinion, I resolved to make a trial of the remedy as soon as an opportunity should offer. The first person on whom I employed it, was a young man in Guadaloupe, of the name of Bonnefond, who had been in the place about three weeks. I had seen him on his arrival, and the full health he then enjoyed, made me fearful that his would be the usual fate of the youth who sought the destructive climate to which he had just come. I was intimate with him, and told him that if he fell sick, I knew of a remedy which would cure him. We had formerly met with

each other at Bordeaux, and he knew that I was then a student in the hospital de St. André, and attended the lectures there, as well as in Paris. This circumstance gave him confidence in my abilities, though, at the time, I did not practice medicine, preferring the profession of a dentist, as more lucrative, I being the only one in the colonies.

As I had foreseen, Mr. Bonnefond fell sick. He called upon me and informed me, that for two days past he had experienced lassitude and uneasiness, and had spent a very bad night. In short, he had a high fever, with great pain in the head and loins; his tongue was of a vivid red, and he was troubled with retchings. These symptoms were unequivocal. I had by me some lime-water, which I had prepared in case any necessity of the kind should occur, and I gave him a pint of the same, in which I mixed half an ounce of powdered charcoal,* aiding the mixture by a sufficient quantity of lemon syrup. He rejected a part of this by vomiting, and in a quarter of an hour I repeated the dose. The retchings ceased, but were succeeded by severe colic pains, whence I conceived it necessary to clear the bowels as soon as possible, of the offending matters contained in them. Accordingly, I administered two ounces of castor oil, and, as soon as it began to ope-

* Charcoal, administered in such a dose, is of itself a powerful cathartic.

rate, I continued the use of the charcoal, an ounce of which I mixed in a quart of lime-water sweetened with lemon syrup, ordering him to drink a gill of it every time he had a stool.* The evacuations were very abundant, yellow, green, viscid, and even black, but they had nothing of the fetid odour peculiar to the disease. Towards evening, the mordicant heat of the fever had subsided; the patient passed a pretty good night, enjoyed some sleep, and perspired a good deal. His thirst was no longer distressing, yet I thought it expedient to give him frequently the lime-water with charcoal, as before. The next day I administered an ounce and an half of castor oil: the stools were more copious than before, but equally free from any fetid smell. The third day I omitted the cathartic, but continued the use of the lime-water with charcoal, in the same dose. The fourth day, as the tongue was still furred, though neither dry nor dark, I gave an ounce and a half of castor oil; the evacuations were copious and unattended with pain. The alarming symptoms disappeared, and on the fifth day the patient was entirely out of danger. His convalescence was very speedy.

After this successful trial, which fully satisfied my expectations, and proved the truth of my theory, I had only two more opportunities of employing the same

* Common lemonade was often given as a diet drink.

treatment, and in both cases the result was equally happy. The English having taken possession of Guadalupe, I was among the number of those who left the place.

If, gentlemen, I had made numerous and recent trials, I should offer you my observations with more confidence. One of the motives which has caused me to delay presenting the preceding facts to your notice, was the desire of making new experiments; but I finally concluded, that as I was not a practitioner of medicine, to say I had a remedy for yellow fever, would sound too much like quackery.

Excuse me, therefore, gentlemen, that I have not sooner made this communication, and believe, that in pointing out a new mode of treatment for that dreadful disease, and which I believe to be the only one capable of effecting a cure, I am influenced by motives of humanity, and not by a vain self-love.

I have the honour to be,

Gentlemen,

Your most obedient

Humble servant,

ANTHONY PLANTOU,

Surgeon and Dentist.

Additional remarks and observations on the cure of putrid and malignant diseases in general; applicable also to cases of poisoning by mineral or vegetable substances: a parallel between the yellow fever and the plague; their causes; the rational treatment of the latter, with the means of retarding or preventing the return of both. Concluding remarks on caloric and cold, and their connexion with electricity and magnetism.

To the preceding letter, and such of the following observations as particularly related to the yellow fever, no answer was received from the board of health of New-York. Thinking, notwithstanding, that a subject of so much importance to their health and welfare, and that of other nations, would not be considered uninteresting by the public, I added such remarks as suggested themselves on the cure and prevention of the plague as well as of the yellow fever, in order to render my labours as useful as possible to mankind.

I have often assisted at the autopsic examination of individuals who died of the yellow fever, in the hospitals of Guadaloupe and Martinique. In every instance I have observed excoriations on the oesophagus, and gangrenous and sphacelated spots more or less extensive, on the stomach and intestines. These I could

attribute to the corrosive property only which the bile had acquired, in conjunction with some vitiation of the gastric juice. The above appearance, in my opinion, imperiously forbids the use of emetics, especially those derived from the mineral kingdom, because their action cannot but increase the erosion already existing.

I also consider castor oil the best cathartic we can employ in this disease, from its power of involving and blunting the corrosive matters, and sheathing the stomach and bowels from their acrimony. My mode of proceeding resembles the treatment employed in cases of poisoning, and I believe it to be the more reasonable, from the fact that the effects produced by mineral poisons, and by that which I think may be justly termed animal poison,* are almost the same, with this differ-

* *Animal poison*—not *virus*; which constitutes and proves its non-communicability from person to person, inasmuch as it is essential that two conditions should be fulfilled before the disease can exist. 1st, There must be a sufficient degree of excitability in the individual or individuals: 2nd, a sufficient source of deleterious effluvia. The infected person is never a centre of contagion, as in the small pox, syphilis, hydrophobia, &c. A *virus* differs from a poison in its action on the animal economy; 1st, by its very nature; 2ndly, by its affinity with the fluid it attacks; that is to say, a *virus* is of a viscid quality, and, for this reason, attacks the lymph, which once deteriorated becomes contagious. Some *virus*, it is true, act by exhalation as well as by contact; *exceptio probat regulam*. On the other hand, poisons act by a caustic, corrosive, or narcotic principle, and their action is principally directed to the digestive apparatus, which is proved from the effects which have been produced by the mere external applica-

ence, that the former excite vomiting only, while the latter, being spread over the whole alimentary canal, consequently produces both purging and vomiting. In both cases the post mortem examination shows that the stomach and intestines have undergone the action of a violent corrosive principle.

The excessive heat* is, as I have already observed, the primary cause of yellow fever in this country as well as in the West Indies. I consider it the primary cause for this reason; it promotes the decomposition of animal and vegetable substances, and the exhalation of deleterious miasmata thence arising, while at the same time it renders the animal economy more susceptible of their destructive influence. Does not experience prove that in this country, and in Spain, where the yellow fever has so often made dreadful ravages, it has always made its appearance during the hottest months, and disappeared as soon as the cold became somewhat severe. If such were not the case,

tion of preparations of arsenic or verdigris; whereas virus have no influence on the organs of digestion, a proof of which is, that the virus of the viper has often been swallowed with impunity by bold experimenters. The Creole has not the degree of excitability necessary to contract the yellow fever; yet the bite of a serpent causes death in him as in a European, and he is equally subject with the latter, to small pox, syphilis, &c.

* That is to say in this country from 85 to 90 degrees and upwards of Fahrenheit.

Havanna, New Orleans, and Charleston would, like the West Indies, be the constant seat of this terrific disorder.

The causes of disease are much less numerous than is generally supposed; and, I repeat it, I consider the excessive heat as the parent of all putrid and malignant disorders. I therefore conclude them to be different in degree of malignancy only, according to the quantity of miasmata floating in the atmosphere, and the predisposition which may be present at the time in the animal economy. I therefore trace the genealogy of these diseases as follows: 1st. simply putrid; 2nd, putrid and malignant, which are the typhus, cholera morbus, some insidious and epidemic fevers, violent dysenteries, scurvy of the first and second degrees of violence; and 3rd, highly malignant, which are the yellow fever in all its grades, and the plague, which, like the former and other high fevers, varies in degree of malignancy, according to the proportion of matter existing in the individual, favorable to the action of the deleterious and fatal agent.

The last mentioned disease, which has for ages made almost annual ravages on the borders of the Nile, where it has its origin, is caused also by excessive heat, and the deleterious exhalations arising from the filth and ooze which that famous river leaves exposed on its subsiding, as well as from the swamps and ponds

which abound in that country. The disease gradually spreads, carrying death and desolation in its course, during the months of March, April, May, and June, and then, sometimes by degrees, sometimes suddenly, disappears. Its cessation is ascribed to the northwest wind which regularly begins to blow at that period, and to the copious dews, which are so impregnated with nitre as to cover the hillocks frequently like a light fall of snow, insomuch that the salt is collected for the purpose of manufacturing gunpowder. These two causes combined, suffice to purify the air and restore health to the country.

At Constantinople it is constantly observed that the accession of cold weather puts a stop to the plague.

The climate of Egypt establishes the same difference, which, as I have to remark hereafter, exists between the natives of the United States and Spain, and the Creoles of the West Indies; that is to say, the Egyptians and Ottomans after having the plague once, are not less subject to its attacks, for the reasons I have to state with respect to yellow fever.

The cause of the two diseases being the same, the effects ought to be similar. Accordingly, the principal symptoms of both are, general prostration, great pain in the head and loins, vertigo, extreme thirst, redness of the eyes and face, very high and hard pulse, a pain in the stomach and bowels, giving the sensation of burning coals, black vomit, and fetid dejections, yellow, vio-

let, or black colour of the skin, in fine, marks of gangrene on the stomach and intestines after death. The sole difference before the fatal event, is the determination to, and inflammation of the inguinal or axillary glands, which I take to be a sign of greater malignancy, whence it follows that death sooner takes place.*

When the degree of violence in the disease is such as to allow the buboes to suppurate, the patient frequently recovers, yet even though the disease is not at its highest degree of malignancy, the buboes generally do not proceed to suppuration ; they excite excruciating pain, suddenly change from a red colour to a livid, and finally, to a black hue, whence the denomination of carbuncle. In these cases the disease terminates in death in the space of one, two, or three days; but when this disease is in the highest degree of malignancy, it attacks the principle of life so suddenly and violently, that nature has not time to offer any opposition, and sinks under it before the infecting poison can be brought to the surface; there are no buboes; there is no series of symptoms; the victim dies as if struck by lightning.

From the reasoning I have just made, and the parallel drawn above, I infer that the mode of treatment which I have recommended for one disease, is equally applicable to the other.†

* A collateral proof of the similitude of the two diseases, is to be found in the occurrence of carbuncles in certain severe cases of yellow fever.

† It is in this case, that camphoretted oil frictions on the inguinal and

The plague, like the yellow fever, has its general and particular degrees of malignancy. There are seasons when it renders cities and country, as it were, a vast grave, while the following year, and sometimes several years afterwards, the number of individuals who die of it bears no proportion to those who perished of it in preceding periods. In these mild years it is observed that the prevailing diseases are simply putrid, but in some individuals, take on the character of malignancy; and in these cases the symptoms are exactly concomitant to those of the yellow fever; the inflammation of the inguinal or axillary glands not taking place. This exactly accords with my foregoing observations, where I considered this symptom as indicative merely of a higher degree of malignancy.

If it should be asked why in the same country, in the same situations, and under circumstances apparently the same, the plague should make so many victims one year, and so few another, I would answer, that though the circumstances appear to be the same they are nevertheless very different. For I may almost say that in a disastrous year the monster devours itself, but arises again like the Phoenix from its ashes; or that it is like those volcanos whose eruptions never cease until their entrails are consumed. But lest I should be axillary glands, as well as on the abdominal regions, ought to be insisted upon, with clysters of oil and linseed decoction in a small quantity, so as to be retained in the bowels.

ambiguous to some, I will express my idea in less figurative language. I would say that these disastrous years derive their source from the mild ones, during which the poison has remained dormant; that this, by its accumulation, if I may be allowed the expression, fills the measure at last till it overflows; and that this overflowing takes place at more or less distant periods, according to the degree of rapidity with which the collection of miasmata takes place. At length when the heat becomes sufficiently great, and every thing is ready to bring these effluvia into action, the atmosphere is suddenly charged with them, and carries death almost to every individual who breathes it. The degree of malignancy, therefore, is in proportion to the degree of heat, and it is this difference of temperature which constitutes the difference between the cause of plague and that of yellow fever. These remarks on the plague, lead me to extend the corollary to the yellow fever, and I shall call to the aid of my argument the epidemics of 1793 and 1798 in Philadelphia, that of 1819 in Charleston, that of the same and of this present year in New Orleans, and lastly that of 1821 in Spain, as terrible witnesses.

In the Medical Journal of Dr. Wm. Wittman, member of the Royal College of Surgeons of London, and surgeon of the English army in Egypt in 1799, 1800, and 1801, I remark, that the treatment for the plague is the same as has been employed here to this

day for yellow fever, viz. bleeding, emetics, calomel, blisters on the breast, stomach, and even on the head, and the bark in large doses. He says that the only remedy which seemed to have a good effect, was oil employed externally by friction. The reason of this is very plain: it is, that of all the remedies prescribed, the last with blisters, is alone applicable to this disease. But it is not to be employed externally merely, and if it has done good when used in this way, it can only be attributed to the absorption which took place, and thus diminished the violence of the disorder.*

It is known almost to every one, that the Creoles of the Windward and Leeward Islands, as they are called, are not subject to the yellow fever. The reason is evident; it is that custom is a second nature; they are born in an air impregnated with miasmata, and breathe it from the first moment of their existence, whence their constitution is very different from that of the natives of temperate climates. They are in general enervated, phlegmatic, and of a lax fibre, while strangers who go to that country are quite the reverse, and this it is which

* In my opinion, daily frictions with oil would prove an effectual prophylactic of the plague, both by preventing the dryness of the skin, which the excessive heat would otherwise occasion, and hindering the absorption of deleterious miasmata through the pores. I have observed in the West Indies, that negroes who worked naked under a burning sun, were naturally covered with an oily perspiration, which prevented that affection known by the name of a stroke of the sun, which the whites are so subject to; for the same reason, no doubt, the former are not affected with yellow fever in that climate.

draws the line of demarkation between them. After a residence of some years, however, this line of demarkation ceases to exist, for in that time, the latter acquire the privilege enjoyed by the Creoles, either by having the yellow fever, which is called taking the sickness of the country, or by undergoing less dangerous disorders. But the instances of this kind are, alas! few. It is calculated that generally in the space of five years, ninety out of one hundred perish of the yellow fever, violent dysentery, and other diseases, and that ten years afterwards, five of the ten only remain. These, it is true, may, like some of the Creoles, live to a great age.

The difference in the climate of the West Indies, and that of temperate countries, causes the difference in the susceptibility of receiving the yellow fever more than once, in one place or in the other. If an individual in the West Indies has the disease once, and recovers, he has nothing to fear from it afterwards, provided he continues to reside there. On the contrary, in this country and in Spain, instances are not unfrequent of persons recovering from yellow fever one year and dying of it the next, or some years after. The cause is, that the cold succeeding the heat restores to the fibre and to the whole frame that tone, which once lost in the West Indies is never renovated, unless by removal to a temperate climate.

Since it is proved to demonstration, that in this country, the excessive heat is the exciting cause of yellow fever, and that it is only requisite that there should be a sufficient quantity of deleterious matters for this heat to act upon, to produce the disease, the best method to retard or prevent its return, particularly in large cities, must be to endeavour by every means to dry up marshy spots, to fill up stagnant pools, to cleanse every place engendering or containing deleterious matters, and especially not to allow any body to be interred at any season of the year, without having charcoal and quicklime placed in, above, and below the coffin. The same precautions ought every three months to be taken with privies. The moment of danger ought not to be waited for, nor ought these precautionary measures to be left to the care of tenants or proprietors; these most important and necessary duties ought to be attended to by the municipal authorities of every city; they should be scrupulously fulfilled, for the health, the fortunes, and the lives of the citizens are at stake. A good government, a good administration, should watch over these as well as over the morals of the people; it is for them to attend to these things, and not to leave them to the indifference of the inhabitants, who, like shipwrecked seamen, seldom fulfil, when the danger is over, the vows which they make while in distress. It is thus that in a short time quarantine

regulations may every where be safely subrogated.* The internal enemy is most to be suspected; it must be subdued, it must be destroyed, by depriving it of alienents. It is thus, that here, in Europe, and every where

* When I say the quarantine laws may in a short time be safely subrogated, I mean, after the sources of deleterious miasmata shall be completely removed in the interior, under which circumstances, a vessel which has in itself the elements of the yellow fever, will not be capable of infecting any port or city; while, if the precautions I have advised should not have been properly executed, the entrance of this same vessel would be like the application of a torch to a train of gun-powder. An infected vessel should be abandoned by the crew as speedily as possible, if they would diminish the number of victims; for it is useless, in such a case, to brave certain destruction; and this year, if the Macedonian and the Hornet could have been thus deserted, the lives of many useful individuals would certainly have been saved. By acting thus, the safety of all will be obtained, and neither lives nor time will be lost. For a new crew cannot be engaged for such vessels, till the season allows to be done without danger, all that is necessary to purify them from deleterious matters, which will not fail to make new ravages the next season, if they are allowed to remain undisturbed.

Infection does not and cannot take place, except within the miasmatic circle. The centre of this circle is the most dangerous; and the least dangerous place is at the extremity of its radii. The individual or individuals enclosed within this circle, are thus exposed to infection, but cease to be so, when beyond it. It is for this reason that patients removed to the country, or to a part of the city to which the miasmata do not extend, recover more easily, and do not endanger the health of any other person. The following is a comparison, of which I was myself the subject. I was one night exposed to the action of carbonic acid gas, proceeding from the embers of a stove, the damper of which was closed. I fell twice or three times in the

else, bounds may be laid to the tyrannic empire of death.

The preceding observations lead me to observe, that in Egypt, the plague owes its malignancy less to the excessive heat of the climate, than to the great uncleanliness of the people, and to the numerous infectious spots which abound there, and exist even in the heart of their cities. Among others we may adduce the instance of Rosetta, where the plague always commences, and makes the greatest ravages. The narrowness and filthiness of its streets, its topographical position, the ponds of water with which it is surrounded, the putrefaction of all kinds of carcasses, which from culpable negligence are allowed to lie above ground; in fine, corpse heaped upon corpse, in the burying grounds which, as here, are in the middle of the city, sufficiently explain why it has the frightful privilege of giving birth to the plague.

If, from the borders of the Nile, I turn my eyes to act of going from my bed to the window, which I opened. It is unnecessary to add, that I used the means directed in such cases. My wife was much more affected than myself; but a servant who slept in a closet by the side of my room, only separated by a partition with a door, experienced no inconvenience. Another comparison is that of a well or a *privy*, containing this same gas, into which a person descending is suffocated, while those above are unaffected. It is thus by analogy, that I explain why, in the Grotto del Cane, a dog falls into convulsions, while his master standing up, and having his head above the gas, respires pure air, and is consequently safe.

the banks of the Mississippi, and let them rest on New Orleans, I see a gay population, occupied only with pleasures and amusements when the season of death is past. The thirst for riches makes them forget the risk they have run in the pursuit; and, intoxicated as it were, they haste to grasp the enjoyments of a life which, perhaps, is not long to last. The germs of corruption, however, are every where unfolding; the wharves are in the worst state; the streets are extremely dirty;* stagnant waters exist in and out of the city, and quantities of filth, which are thrown out from the vessels, and otherwise accumulated, are left exposed by the subsidence of the river, which usually falls from 20 to 24 feet, in the worst seasons. It is true, that from New Orleans being situated below the level of the Mississippi, its atmosphere cannot so easily be purified as that of other places: nevertheless, it may be completely raised and paved. Though no stones are to be found there, the immense commerce which has made the city so flourishing, will render a supply of them easy. It is only necessary to pass a law obliging every vessel according to its burthen, to bring every voyage a certain quantity of stones, with which several streets may annually be paved; and I would advise them to be laid upon a bed of charcoal. For many years, the neces-

* There are only one or two belonging to Mr. Morgan, Merchant, that are paved.

sity has been perceived of washing the gutters, which are constructed only of planks, often badly joined, and allow the water to drain through and stagnate beneath, so that corrupting, it exhales a fetid odour even in winter. It was for this purpose that seven or eight years ago a steam engine was erecting to furnish a supply of water morning and evening. However, the death of Mr. Latrobe, jr. in 1817, and Mr. Latrobe, sen.* in 1820 having necessarily suspended the work, this steam engine has never been finished, as if there were not to be found in the United States men sufficiently enterprising and capable to perfect it.

It still remains to point out two abundant sources of deleterious miasmata; these are privies and burying grounds. With regard to the first, they are in New Orleans, more than any where else, the focus of pestilence, because the surface of the ground does not permit them to be dug more than six inches deep without their being filled with water the moment they are made. There are two methods of obviating the bad effects of these; the first is suggested to me by experience, for I have observed in Pointe à Pitre, and in Basse Terre, that there are no privies, all the soil being daily carried to the sea by slaves; and why in New Orleans may it not be thrown into the river? Or rather, which I think would be preferable, there should be constructed a mile or two from

* An architect of great merit.

the city, reservoirs, raised five or six feet above the level of the ground, in order that the moisture may drain off. Instead of digging privies, casks ought to be kept in every house, to be carried away and emptied into the reservoirs every month, as will be particularly explained hereafter. The fœcal matters contained in the reservoirs, would form, when dry, one of the best manures. There are persons in Paris who have acquired large fortunes by dealing in what is called *la pouddrette*, which is nothing more than the fœcal matters dried and burned. As respects burying grounds, the means I have before mentioned ought to be employed, that reason may triumph over prejudice, and civilization regain the rights which barbarism has usurped. The Romans burned their dead, and preserved their respected ashes in costly urns, with which they ornamented their houses, and this custom had at once a moral and salubrious intent.

I cannot leave this subject without taking notice of the island of Cuba. This charming country, which travellers justly compare to a terrestrial paradise, seems profusely blessed with all the gifts of Nature. There reigns an uninterrupted spring; there are flowers and fruits of every season; the air is embalmed by a thousand perfumes; infancy, maturity, and old age, all enjoy perfect health. Gayety, pleasure, and hospitality

form the charm of their whole existence; in fine, the inhabitants of the country enjoy all the happiness of life. But in Havanna, the air is so impregnated with putrid and infectious miasmata, that great numbers, attracted from all nations by commerce and the hope of enriching themselves, fall victims to the yellow fever. The causes I have mentioned, when speaking of New Orleans are almost the same in Havanna; with this difference, that in the latter city, the air may much more easily be purified, if the municipal authorities would employ the means which humanity loudly calls for.

It is here to be remarked, that in Paris, in 1554, the suppression of the Cemetery of the Innocents, was ineffectually demanded, and it was not till the year 1785, two hundred and thirty-one years after, that a resolution was taken to remove from the city that focus of putrefaction, which caused every year epidemics more or less afflicting, according to the proportion of putrescent materials, and the degree of heat in concert therewith. Previously to taking this step, the people had often offered up prayers to heaven, to relieve them from the scourge of pestilence; but they did not reflect that God has not said, that he will, at our desire, change his laws, which are immutable; that, for our asking, causes shall cease to produce their effects; were it

otherwise, he would not be himself the Cause of causes. On the contrary, he has said, "Help thyself, and I will help thee." This declaration of the Deity was then attended to by the good people of Paris, who, on one of those days, when nature forces the destructive effluvia to retire deep into the bowels of the earth, set about the work, and transported the bones of their fathers to the quarries* from which they had taken stone to build the city. All the bodies which were still capable of undergoing putrefaction, were covered with a sufficient quantity of quick lime and consumed. Since that period, this part of the city, which is one of the most crowded, though not the most clean, has nevertheless been as healthy as any other; and through a prodigy performed by reason, the throne of disease has been metamorphosed into a cornucopia.†

* To which they gave the name of the Catacombs.

† The burying ground was converted into a market, called the market of the Innocents. In the centre of the square rises a magnificent fountain, with a jet of water on four sides, falling into a basin. It is ornamented on each side with basso-relievos, of the celebrated and unfortunate John Goujon, who, while employed in adorning the Louvre with his immortal sculptures, received a blow from an atrocious and envious artist, unperceived by any one, and perished by falling stunned from the scaffolding, which was more than 60 feet high.

Since the year 1785, no bodies are buried in the churches, and the burying grounds are removed to the distance of two miles from the city. They are on elevated spots; one is called the church-yard of Pere la Chaise, and the other of Mont Martre.

It is to be hoped that an example so salutary, will not be held up in vain to a people like that of the United States; a people which, in a shorter time than the French took to deliberate upon the subject of the public health, has founded a number of cities, of which the population equals or excels that of the second order in Europe, that have been thousands of years in existence; a people, whose exalted courage has raised it to the highest rank among free nations, and which, not long since, so nobly fought to preserve its just independence; a people, in fine, among which the spirit of philanthropy has no bounds but those of justice; it is to be hoped, I say, that now the veil is removed, and it may be seen by the broad light of reason, that the germ of the destroyer of its health, its commerce, and its future fortunes, is in its very bosom, the same zeal will be shown in destroying it, as was manifested in breaking the shackles of despotism. Let it be well considered, that the evil increases in proportion to the indifference with which it is regarded; let the loss already sustained, the present loss, and the loss to be expected, be properly reflected upon, and there will be no fear of prejudice, expense, or difficulty, in the undertaking.

It is to be hoped that *our* people will listen, at the same time, to the voice of reason and necessity, much

more imperious here than in France,* where the heat being less, produces less exhalation of miasmata dangerous to life. No one can be ignorant, that burying grounds and privies,† in the heart of a city, contribute more than any thing else to give to the water qualities pernicious to health, and that if this state of the water have less activity in its action than impure air has, yet it aids in augmenting the effects of the latter. New-

* In Paris, the greatest degree of heat is from 60° to 65° Fahrenheit, while in New Orleans, Charleston and Savannah, it rises to 90° 95° and 100°; in Philadelphia, to 90° and 95°, and it has even been known to rise to 102°. This difference is very considerable, nor is it less remarkable from its effects. For, were the temperature of Paris suddenly to become as high as that of Philadelphia, the former, by reason of its crowded population, pent up in six story houses, the narrowness of its streets, and the uncleanliness of certain spots, would, instead of the yellow fever, experience a plague of the worst kind.

† Sinks for privies in a country like this, where the heat in summer is so great, are a focus of infection, and ought to be entirely suppressed by municipal law, which may easily be done as follows. Every house ought to be provided with two casks, each capable of containing all the soil accumulated in a month, at the expiration of which time, the full cask should be raised and conveyed to be emptied into reservoirs, two or three miles from the city, such as I have proposed, when speaking of New Orleans. These casks may be furnished with covers, to close them hermetically, so that no unpleasant smell will be perceived, in removing them for the purpose of being emptied. The adoption of water-closets, as used in London, would be preferable even to the above plan, in a city plentifully supplied with water, as is Philadelphia, though the necessary expense of constructing them, would be an objection to their general use.

York, Charleston, Savannah, Norfolk, and every city which has not the benefit of soft water, are particularly exposed to these two causes united.

To return to the treatment of yellow fever; in saying that the disease is divided into three stages, I confined myself to the observations of the learned physicians with whom I was acquainted in Guadaloupe and Martinique, of whom I need only mention Dr. Amic of Basse Terre, Dr. Barbès of Pointe a Pître, and Dr. Gaubert of St. Pierre de la Martinique. These gentlemen, as I have before said, consider one period of the disease inflammatory, but so rapid in its progress that blood-letting can rarely be employed with advantage. I should be happy to found the whole of my belief on the knowledge of the above distinguished physicians, yet though unknown in medicine, and almost ignorant of the science, it is not impossible that my own opinion may be correct, when I make bold to declare it my belief that there is no truly inflammatory stage in yellow fever; that the redness of the face and eyes, the accelerated pulse, the vivid colour of the tongue, and the burning heat of the skin, are but the symptoms of commencing corrosion, shortly to be followed by putrefaction and death, if means are not immediately applied to the seat of the disorder, capable of arresting the first and preventing the latter. I

infer, consequently, that blood-letting should be utterly proscribed in the treatment of yellow fever.

Not to appear wanting in deference to the opinion of practitioners who hold a contrary doctrine, I would beg leave to inquire, if they have ever employed blood-letting in any disease which they considered of a putrid character. Have they ever employed it in slight or violent cases of cholera morbus?—No—on the contrary, they have endeavoured to allay the irritation of the stomach and bowels by a plentiful use of diluents; they have employed the most powerful anodynes in large doses; they have, in short, properly fulfilled the indications.* Now, in this country, no two diseases are more similar than cholera morbus and yellow fever; they are similar from the cause, which is the excessive heat, and from the effect, which is a violent irritation of the stomach and bowels, arising from acrid and fermented bile, and terminating in corrosion of those parts. The treatment of cholera morbus is well adapted; but, in severe cases, the means employed, it appears to me, are not sufficiently energetic. I leave to future experience to decide whether the treatment I have recommended

* This mode of treatment proves how much the science of medicine has improved of late years. For at a period not very remote, recourse was had in extreme cases, to the exhibition of leaden bullets, and quicksilver by pounds, to render straight that canal which nature had unfortunately formed tortuous.

for the yellow fever would not be equally applicable to cholera. For in this disease it will not do to attempt to reach our object by circuitous routes. Death is at hand, and must be vigorously resisted, or nature will sink beneath its stroke. If the cholera morbus is never epidemic in this country, it is often so in India and in China, where it makes still greater ravages than the yellow fever does here.

I feel convinced that this treatment is adapted also to the cure of that dreadful disease, the scurvy, which so often proves the scourge of camps and vessels, and which made such horrible destruction among the troops stationed at Terre aux Bœufs, in 1809, much aggravated, no doubt, by the injudicious use of mercury.*

Though I have been fortunate enough to cure the yellow fever in three instances, I attribute my success entirely to the use of charcoal and lime, which being most powerful antiseptic and anti-gangrenous remedies, decomposed and neutralized the corrosive principles of

* An anecdote is related of one of the soldiers labouring under this disease, whom the hospital surgeon, upon visiting the sick in the morning, observed stretched out in the corner of the room, with a quantity of sorrel and green buds which he had procured, and of which he was eating; he turned to the attending surgeon and said, Give this man the mercury: try the experiment; for I am persuaded it is the most effectual remedy that can be exhibited in this disease. The patient overheard the charge, and replied, None of your experiments with mercury on me; I am doing well enough; and if you will let me alone I shall get well. The surgeon, in good humour, granted his request, and the man got well.

the bile and of the gastric juice, removing at the same time the effects of deleterious miasmata. The castor oil assisted in the cure by involving and evacuating the same corrosive principles. The quantity of this must be proportioned to the urgency of the case. If two ounces at first should be found insufficient, the dose should be increased till abundant evacuations are procured. In addition to this treatment, advantage may be derived from the use of camphorated oil, applied milkwarm, by friction, to the abdomen and axillæ. It was by no means without design that I employed lime-water* as a vehicle for the administration of the charcoal. I chose it because it is of itself anti-emetic, tonic and antiseptic, and because it augments, by its combination with the charcoal, the oxygen which the latter contains in abundance.

To cure the yellow fever is doubtless very desirable, but to prevent it, still more so, and if charcoal possess the power of arresting putrefaction, when it has commenced, it is reasonable to suppose it will prevent it. I would therefore advise its use as a prophylactic, in the dose of a drachm, taken daily in the morning fasting, mixed in syrup or molasses and water. This precaution may the more easily be observed, as this powerful remedy costs almost nothing, is everywhere to be

* If the dose of lime-water, which I have already prescribed, should not be found sufficient to arrest the vomiting, the quantity may be augmented without the least danger.

had, does not impair digestion, as I have myself experienced, and has no unpleasant taste.

In a word, in summing up the uses to which this medicinal combination may be applied, I think it adapted to all malignant diseases, where the vital principle is imminently endangered, and, where the question is promptly to neutralize the cause and prevent its effects. I consider it useful also in cases of poisoning by metallic substances, as well as in that from mushrooms, to which case I believe it to be particularly applicable.*

I am of opinion, that in all cases where the vital energy requires raising, blisters may be employed with great advantage; but they should be applied only to the thighs and legs. One means, which is at hand in this country, and which they have not in the West Indies, is ice; it may, with the same intention that blisters are used, be employed to cool the drinks, and as a powerfully tonic application to the abdominal region. Clysters, also, composed of equal parts of olive oil and flaxseed tea, in the quantity only of a quarter of a pint, that they may be retained in the bowels, will prove very useful.†

* Since my discovery of the virtues of charcoal, I have recommended it as a powerful antiseptic, to several distinguished practitioners of Paris, and among others to Dr. Coutens. He used it in 1811 in cases of obstinate dysentery, and by it operated cures in a short time; the fetor of the stools being corrected in a few days after its exhibition. I also recommended to him lime-water, as an antemetic and powerful vermifuge.

† These, as well as the frictions with camphoretted oil, are particularly applicable to plague.

The sole nourishment I employed was rice gruel.

I greatly approve the use of lime to disinfect places which exhale deleterious effluvia; but I think that pounded charcoal would have a much more powerful effect, and that they ought always to be employed together, when they are used in aqueous or humid situations.

Charcoal has the valuable advantage of preserving its antiseptic virtues even after it has produced its effects, whereas the power of lime is momentary. The former may, in this respect, be compared to musk, which will for years exhale its odorous principles, without sensibly losing either weight or smell.

After having had the boldness, in the course of this little work, to express some truths drawn from my own observation, I feel happy to shield myself beneath the ægis of the god of Medicine, and hear himself pronounce the oracle,

“Contrariis contraria curantur.”

It is upon this celebrated maxim, that I shall found my attempt to analyse the treatment actually employed at the present time in yellow fever. The remedies in use are,

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| 1. Bleeding; | 2. Emetics; |
| 3. Purging by calomel and jalap; | 4. Mercury; |
| 5. The bark; and, | 6. Opium. |

1.—*Of bleeding.* I have already made the remark,

that in yellow fever there is no truly inflammatory stage, and that the redness of the eyes, face, and tongue, the accelerated pulse, and the heat of the skin, are but indices of the action of a corrosive poison, which ought to be arrested as quickly as possible, by such means as are capable of neutralizing and involving the same. If it be said, that nevertheless persons have recovered of the yellow fever, who have been bled seventeen, or even twenty-one times,* I would answer, that this disease has different degrees of malignancy, and that the two cases cited must have been so mild that the patients would have recovered if they had not been bled.

2.—*Of emetics.* I compare good health to a balance in exact equilibrium. When disease is thrown into one of the scales, the equilibrium is destroyed; and when the physician is called in to restore it, he must effect this restoration by placing the remedy in the opposite scale. Now, I would beg leave to inquire of medical gentlemen, and of every man of common sense, whether, in cases of poisoning by arsenic, corrosive sublimate, acetate of copper, acetate of lead, &c. they would give the patient a powerful emetic, as is generally recommended by writers; I would ask whether it would not be heaping the medicine on the offending matter to augment its

* See Medical Repository, vol. V, N. S. p. 237.

power. I think I am aware of the reason which leads those who recommend this treatment, to believe it a correct one. They conceived it to be necessary to eject the poison in every case, by the shortest way, and to expel it violently; whereas, it is reasonable first to neutralize it, then to involve it in oily medicines, and gradually to eject it by the longer route.

It is here to be proved, that although the patient vomits, or has an inclination so to do, this tendency must not be aided or augmented, and that the rule of assisting the efforts of nature, is here truly fallacious; the vomiting ought to be checked or suppressed, if possible, as it is frequently found to be useful to do in cases of poisoning by mineral or vegetable substances.

3.—*Of purging by calomel and jalap.* Purging ought certainly to be employed; but for this purpose we should use oily cathartics only, and not drastics, when the irritation of the stomach and bowels nearly approaches to corrosion.

4.—*Of mercury.* To use this remedy with the hope of bringing on a crisis, that is to say, of opening a way by which nature may rid herself of a poison that so imminently endangers the vital principle, between which and that poison, the struggle should be ended in one, two, or three days; to use it, I say, with this hope, is truly to act blindly and without a knowledge of the ene-

my to be encountered; for the operation of the medicine cannot become sufficiently powerful but in a space of time, before the conclusion of which the patient has ceased to live.

When this remedy is used to blunt and destroy a virus, which gradually proceeds to the very bones, it is very well; when employed for an obstruction of the liver, of the mesenteric glands, or other parts, 'tis also very well; when recently employed for the removal of the rabific virus, 'tis still very well; for in these cases, the physician has at least the power of managing at will, this *grand cheval de bataille*.

5.—*Of the bark.* It was long unknown, but is thought to be understood at this day, by what particular principle this remedy acts in intermittent and remittent fevers. It was formerly supposed to be by the tannin, and is now decided to be by that which has been termed *cinchonin*, that is to say, by the principle which has the property of precipitating a solution of tan, and is incapable of disturbing that of gelatine or that of sulphate of iron. Whether its operation depend upon one or both of these principles, is of little consequence; experience has proved it to be unquestionably an excellent remedy for intermittents. But, in yellow fever, the case is very different. It has no intermissions; it is symptomatic, as in the case of an extraneous sub-

stance, which must be extracted before the fever can be removed, on the principle *sublata causa tollitur effectus*.

Cinchona cannot be employed in the yellow fever, nor in the case just alluded to, till after the cessation of alarming symptoms; it is then indicated as a tonic, and as a means of preventing a relapse.

6.—*Of opium.* Of all the remedies commonly employed in the disease in question, opium is the one, on which the practitioner, from an analysis of its properties, should place the least reliance. Its highly stimulant qualities, the difficulty of fixing the dose, the irregularity of its effects on persons of the same age and sex, and even on the same person in the same disease at different times, cause me to regard it as not only very uncertain, but deceptious and dangerous. To employ it in small doses, is to endeavour to extinguish a conflagration with a drop of water; to use it in a large dose, is to increase the mischief; it is, in fine, to seek to destroy one poison by the exhibition of another, and is in direct opposition to the law of the father of Medicine, *contrariis contraria curantur*.

I conclude with Hippocrates, that in this disease, as in all others, where the vital principle is endangered by the effect of a poison, under whatever form it may be, neutralization is the sole indication of reason and

nature. It is therefore to be hoped, that the proposed treatment will not meet the resistance which so long retarded the utility of inoculation, vaccination, cinchona, emetics, mercury, and many other discoveries serviceable to the cause of humanity.

*On Caloric and Cold, as connected with Electricity
and Magnetism.*

“ Regarde autour de toi, contemple tout l'espace,
Par quel divin accord le monde est gouverné,
Nul être n'est oisif, tout occupe sa place,
Et tout est enchainé.”

Having, in the foregoing pages, justly considered excessive heat as the cause of deleterious exhalations, I shall here endeavour to define caloric, and to investigate its properties.

Caloric is the cause of expansion of all bodies, solid and fluid. By its intense action, solids pass into the fluid state, as is seen in the fusion of metals, and fluids become gaseous, as is observed in steam-engines. Excessive heat causes the separation of organic molecules in the three kingdoms of nature, to which, after analysing causes and effects, I add a fourth, to which I give the name of *meteorical*. This comprehends water, atmospheric air, and ether, in which vast space, the powerful empire of caloric is particularly established. This great agent gives birth to the electric fluid, and by rarifying water, air, and ether, gives life and motion to all nature. The sun is its primary source, and vol-

canos are its vast reservoirs. We may thus, I think, explain why mount Hecla, and so many other volcanos, placed by the hand of the Creator in icy regions, vomit perpetual flames, while those situated in temperate climates, or under the torrid zone, are subject only to periodical eruptions. It is thus that I also explain why, before the famous eruption of Vesuvius in 1779, the sun was for many days deprived of its rays and usual heat, which circumstance has been observed to take place more or less before every eruption. These reservoirs are intended to counterbalance the other agent of nature, which tends to the condensation of organic molecules, and without which the earth would shortly be consumed, and by which, without the first, it would soon be reduced to an inert mass, which is proved by the congelation of spirits, and the change of quicksilver to a solid state, in approaching the poles.—The former is to be considered as the primary support of life, as is evinced in the process of incubation, and the latter as the final cause of death, which is proved by its usurping the place of the former, in a body that has ceased to live.—The reservoirs of this last are situated about the poles, and on the tops of mountains. The absence of such reservoirs in this country, is the reason why places under the same latitude as others in Europe, are subject, notwithstanding, to much greater

vicissitudes of cold and heat. In fact, instead of mountains forever covered with snow and ice, we have here merely immense lakes, which receive and transmit successively heat and cold,* with the same facility as these are transmitted to them. The presence of the Andes, and the elevation of the soil in South America, sufficiently explain why the heat is not so excessive under the equator, as it is in North America.†

* I have before stated the maximum of heat in this country, and I may now remark the greatest degree of cold to be from zero to several degrees below, on Fahrenheit's thermometer. The weather, however, seldom becomes severe before Christmas. It frequently changes so suddenly, that I have seen 24 degrees difference of temperature in the short space of 4 hours. On the first day of this month, December, the weather was as warm as in summer, and attended with a severe storm of thunder and lightning; three days after, the cold was so severe, that in one night all the ponds of water about the city were frozen over.

† God has made nothing in vain—for dreadful, awful, and destructive as their effects may be, volcanos nevertheless cause heat to circulate through all the ramifications of matter; it is thus that we imitate Him, when we light fires to counterbalance the other terrible but necessary agent, cold. Man can in fact much more easily resist the influence of the former, than of the latter. In this particular we may be compared to plants, which grow under a burning sun, but which in cold climates can be kept alive only by art.

To produce great effects great causes are requisite; and as I have just remarked that terrible as may be the effects of volcanos, the all-wise Creator has designed them for an important use, I may add that their *counterpois* are not less dreadful; witness the destructive power of avalanches, and of the islands of ice which are sometimes carried even into

The above circumstances equally explain why the sky is here more serene than in Europe, why the summers and winters are so long, that they absorb, as it were, spring and autumn. The last season is here so fine, that it seems a spring in which nature throws off, instead of putting on, a new dress. This remarkable temperature has given rise to the name of Indian summer.

In favour of what I have advanced, without having the temerity however, to wish to put myself in comparison with the immortal Newton, I would observe that before him, it was unknown why the vast bodies which roll above us with so much harmony, without clashing or confusion, were so preserved in order. To him alone belongs the honour of having been the first to declare, that if these bodies performed their revolutions without interrupting and destroying each other, they obeyed the law of the Creator, who had assigned to each a power of repulsion and attraction.

The existence of the two great agents above mentioned, and their known action in balancing each other for the preservation of this sublime creation, aid me in penetrating to the cause of repulsion and attraction, which are also the effect or result of two other agents. I have reference to the electric and magnetic fluids. I the neighbourhood of our ports. I may observe, *en passant*, that if these two fluids, heat and cold, are in constant action, their causes and the means by which they are renovated, must likewise be so.

have already observed, that caloric is the parent of electricity, and I will prove finally, that in proportion as that agent takes possession of a body which conceals within itself the magnetic fluid, that fluid leaves the same. For instance, a piece of iron rendered magnetic, loses almost entirely its power of attraction when raised to a white heat, and it does not recover that power until cold again returns; whence, it necessarily follows, that magnetism and electricity are diametrically opposed, as are heat and cold, and that if caloric is the parent of the one, cold must be the parent of the other.

As I have already proved that the poles and high mountains are the reservoirs of that agent to which I give the name of *frigoric*, it follows that the magnetic needle obeys its influence by turning towards the former, and that its attraction is always augmented, in proportion as it is placed in an elevated situation, that is to say, in proportion to the degree of cold.* To these

* When any person ascends a mountain to a certain height, is he not frequently a tranquil spectator of majestic, imposing, wonderful, yet dreadful scenes produced by electricity below? It is then that he occupies the region of the magnetic fluid; and thus I would explain why the air which he breathes has a kind of pungency, something piercing and penetrating, like as in winter, being charged with magnetism. In this situation, a person may be said to be in a vernal region, with winter above his head and summer at his feet.

This quality of the air is very hurtful to delicate lungs, and still more so to persons labouring under pulmonary complaints. For this reason, the

two proofs, which would be alone sufficient to confirm my doctrine, I will add a third, capable of subduing scepticism itself; viz. the attraction of the north pole of a magnet, by the south pole of another, and the repulsion of the latter by the south pole of the former, and vice versa.

Truth, like the sun, illuminates the world; and, like him, can never be obscured by the sombre shades of night.*

winter season is so fatal to such individuals, and the fall still more so, by reason that every great and sudden change in the atmosphere, requires a proportionate strength in the body to resist the same.

It will now be easy to explain why the higher a person ascends on a mountain or in a balloon, the colder he finds the temperature of the air, since it is certain that this region is occupied by the magnetic fluid, beyond which is the void in which the planets perform their revolutions.

This arrangement unveils more fully the infinite wisdom of the all-bountiful Creator; for had the burning rays of the sun been transmitted to the earth through a hot medium, instead of bringing forth flowers and fruits innumerable, and being covered every day with a refreshing dew, it would have been a parched and sterile waste. We should neither behold the beautiful variety of the seasons, nor those enchanting scenes, which, enrapturing our forefathers, led them to offer up to heaven the early productions of the soil, the first fruits of their gardens, and the first born of their flocks. Even in this age of corruption, the magnificence and fertility of the earth, which confounds the pride of man, causes him at least to raise to the Almighty a grateful heart, and, when he beholds the benefits so bounteously heaped upon him, leads him

“To look through Nature up to Nature’s God.”

* It is no doubt because we have not sufficiently observed Nature, that we say proverbially, as opposite as day and night, instead of saying as op-

The sun is a body of fire, from which proceeds light and caloric. Light is only an attribute of caloric, but caloric is the parent of electricity, the effects of which are always accompanied and rendered sensible by light. By the rule that all extremes meet in a point, I advance, that as cold is the opposite extreme to heat, it is the parent of a fluid as necessary to the existence of nature, as caloric itself, with this difference, that the effects of the former are rendered sensible by light, while magnetism being entirely void of that quality, acts without striking our senses, except by its effects. Hence it follows naturally, that caloric may act by reflection, and that cold cannot. I am of opinion that the great phenomenon of Aurora Borealis, is produced by a combination of electricity and magnetism, accompanied by the absorption of light.

Ice may be considered a reflecting mirror, and acts in fact as such. The light of day obscures that of the stars, and for the same reason the Aurora Borealis can only be seen after sunset. It is needless to remark, that magnetism is then more abundant than electricity; and, as I consider also thunder and lightning the result of a combination of electricity and magnetism, the reverse

posite as heat and cold. The first is a truth relative only to places, but the second is a truth not only throughout this world, but throughout the universe.

takes place; that is to say, that under these circumstances electricity is in a greater proportion, and that this agent being generally accompanied by light, this phenomenon is visible in the day time, as well as during night; in a word, one exhibits itself under the equator particularly, and in warm climates, and the other towards the poles and cold regions. Although these two fluids are every where in constant and perpetual action, it is no less evident that the first exercises its power in the summer especially, and the latter in the winter. In the last mentioned season, are the astonishing effects of electricity ever observable? is it not remarkable, that if a few flashes of lightning are sometimes seen in this season, it is only on days unusually warm for the time of year? The effect of heat in producing electricity, is very evident in eruptions of volcanos, the immense clouds of vapour proceeding from which, exhibit the most vivid flashes of lightning, followed by thunder extraordinarily loud, as was particularly observable in the eruption of Vesuvius, in 1779.

By analogy I would explain why in summer, our fields are often laid waste by severe hail-storms; it is because at those times there exists a sufficient quantity of the magnetic fluid to congeal the vapours floating in the atmosphere. In the same way I explain why, in the beginning of autumn, and very late in the spring,

snow falls on the mountains; and why, in fine, in the months of October and November, it falls so abundantly in cold regions, as Canada, Switzerland, the north of Germany, Poland, Sweden, Norway, Russia, &c.; in a word, in all countries near the poles. If any incredulous person should ask why the phenomena of hail and snow never occur under the equator or within the tropics, except on the Andes, I would answer that that very circumstance proves the justness of my argument.

However, it is remarkable, that when the cold is very intense, the magnetic fluid has too much power to allow the atmospheric vapours to rise from the earth, by their condensation below, so that the sky is then clear; the same takes place in summer by an opposite cause; that is to say, by their rarefaction; fogs and abundant rains are the result of a kind of a negative action of those two agents; from this it is easy to explain why the cord of an hydrometer is tense or relaxed, and why the spirit of wine or mercury rises or falls in the barometer.*

Having explained by what means the atmospheric vapours are congealed, it will not be difficult to show

* This doctrine is perfectly consistent with the observations of many celebrated men, and among others with that of M. D'Arcet, who says, that "on the Pie de Midi, one of the Pyrenees, salt of tartar remained dry for an hour and a half, though it immediately moistened at the bottom of the mountain."

why the electric fluid, and, I may add here, the galvanic fluid, which is a modification of the same, instantly consume and reduce metals; it is by a force opposed to that which congeals them. The magnetic fluid is the most rectified part of cold, as the electric is the most rectified part of caloric.*

I have already observed that these two fluids are pre-

* The effects of electricity on the animal economy are truly terrible, since it is instantly destructive of life; yet it does not burn or consume the body for this reason: there is in our system another fluid, which not counterbalancing completely the power of the former, allows the vital principle to be subdued thereby, but still often preserves the body, insomuch that the restoration of life is not beyond hope. I compare the body under these circumstances, to a cord which has suffered violent extension, and the former elasticity of which may, by wetting it, be restored. In such cases, I would therefore advise cloths wrung out in cold water to be applied to the head and extremities, employing at the same time frictions, with the same from the circumference to the centre, and proportionally augmenting the degree of cold, by adding ice to the water in which the cloths are dipped. After the equilibrium is somewhat restored, the complete recovery of the patient may be attempted, by slight electric or galvanic shocks. I never tried this experiment, but as the effects of lightning may be imitated upon an animal, the trial may be made to restore suspended animation by the above means.

In a contrary case, that is where the magnetic fluid has conquered its antagonist, the latter must be aided in order to restore the balance between them; after recalling heat from the circumference to the centre, electricity and galvanism should be employed.

Suspended animation from the above cause, and that from drowning, are very analogous; whence the treatment for the former may be also applied to the latter, without neglecting the means usually employed in such

sent in every place, and in constant and perpetual action; that the cause of the magnetic fluid existed principally about the poles, and that the needle consequently obeys their attraction. To these facts, I think we may add one more, which may in time resolve many great problems or difficulties. What I have to remark is, that each of these fluids flows in a current or stream, which divides the globe into four equal parts, the magnetic from north to south, the electric from east to west.* This will perhaps sufficiently explain why their shock causes peals of thunder, as well as the quivering of the clouds by flashes of lightning. This continual current of the magnetic fluid from north to south, in my opinion, obliges the needle to remain in that position; so that having here a good explanation of the phenomenon, there will be no necessity for supposing the whole earth a magnet.†

cases; however, I think galvanism and electricity should precede the use of irritating clysters, and those of tobacco smoke.

* From the properties already known of the tourmaline stone, which is to electricity, what the loadstone is to magnetism, an instrument may be made, which will prove my doctrine, and be very useful to correct the variations of the compass.

† I shall no doubt be reproached with the desire of explaining every thing; but I would rather sin so, than by sterility, from which nothing can be derived. To this crossing of the two fluids, then, I attribute the occurrence of equinoctial storms and hurricanes. As to the phenomenon of water-sprouts, I would explain it thus; a column of electric fluid rises from

When I perceive and pause upon these laws, which govern the universe, I acknowledge with deep-felt admiration, the power and wisdom of the beneficent Creator. I behold the celestial bodies linked to our planetary system, majestically rolling from east to west, round a common centre, which itself obeys the universal law of gravitation. This law is to the sun, the glorious orb of day, what that of death is to the mighty potentates of earth.

The immortal Galileo, who ought during his life to have been much more honoured than even Newton and Franklin have been, received perpetual imprisonment as the reward of his genius. As for me, an obscure man, who dare to follow in the steps of these philosophers, I fear not, (thanks to the age in which we live,) the earth or water into the atmosphere, as high as the electric region only; this column is surrounded or flanked by a sufficient mass of the magnetic fluid, that the first may, by its rarefaction, establish a vacuum; at the same time, a column of water equal in diameter to the syphon, rises into the air, and as it ascends, is converted into vapour and forms clouds; it finally diminishes, in proportion as the magnetic fluid becomes sufficiently powerful to re-establish the equilibrium. Whirlwinds are, no doubt, attributable to the same cause.

In Martinique, as I was one day walking by the sea shore, I perceived, at the distance of about a mile and a half, a water-spout, the diameter of which, at the lower part, appeared to be at least sixty feet. I observed, at the same time, the water rising and changing into vapour, and heard the noise which it made in rushing towards the centre of the column; though then certainly I was far from being able, in any way, to account for the phenomenon.

the fate of the former, nor does my ambition aspire to the renown of the latter. I declare that to them I owe every thing; I do but draw my inferences from the great principles which they have established.*

Analysis of the above system.—The division of our planet into three kingdoms only, is evidently defective, and this is the proof. Is it not true that in arithmetic as well as in mathematics, the divisor must be contained in the dividend, and that the quotient must reproduce the dividend, when multiplied by the divisor? Now, the division of the earth into three kingdoms only, does not distinguish one part three times larger than all the others together, inasmuch as to this day, the sea, water in general, the air and ether have not been included in the kingdoms of nature. It is not the less true that they form an integrant part of the same; and doubtless to this defective division, is to be attributed the obscurity in which the system of the world has been so long involved. Let a fourth kingdom then be admitted, under the denomination of *meteorical*, because from it meteors generally proceed, and in it ex-

* Though I have only mentioned the illustrious names of Galileo, Newton, and Franklin, it is not to them alone I offer my admiration and gratitude. On the contrary, I extend them to all those whose vigils have been the means of rescuing mankind from ignorance, of raising them high above all other created beings, and teaching them to know themselves and adore their Creator.

hibit their most extraordinary phenomena. Let these four agents also be admitted, caloric and cold, electricity and magnetism; of which the cause is now known. Let it be admitted that each of these, by an opposing force, contributes to the preservation and animation of nature; and this grand, immense, and wonderful machine will be more open to our comprehension, to our judgment, and to our understanding, than this little and mortal frame in which I feel the throbings of the heart.

I am too well aware of the power of habit, of education, and the prejudices to which these give birth, not to perceive that reason itself must slowly come to light. Though I have proved the cause of *frigoric*, many will perhaps admit a causeless effect, rather than accept the proof which I have demonstrated.

However, to hasten conviction, may I be permitted to transfer to earth, those laws which govern the heavens—those sublime laws which were ascertained by the immortal Newton! Let any one answer me, whether they act not, operate not, by opposing forces, in which God has shown to mankind the mightiness of his power, and the infinity of his wisdom.

Born in an age of revolutions, may I have, at least, the happiness of contributing to one which shall be useful to mankind.

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OBSE

RVATIONS ON THE YELLOW FEVER.

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